



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

INFLUENZA IN THREE CHICAGO GROUPS*

EDWIN O. JORDAN, DUDLEY B. REED AND E. B. FINK

Opportunity has been afforded us for the study of influenza prevalence in three different population groups in the city of Chicago: (1) The Student Army Training Corps at the University of Chicago; (2) The High and Elementary Schools of the University of Chicago, and (3) the Chicago Telephone Company. These several groups are quite distinct as regards age, degree and nature of association of the individuals within each group, and general opportunities for exposure to infection. So far as known there was no point of contact between the groups.

I. THE STUDENT ARMY TRAINING CORPS

EDWIN O. JORDAN AND DUDLEY B. REED

In October, 1918, influenza broke out in a group of the Student Army Training Corps at the University of Chicago. This group, known as Section B, comprised 234 men, nearly all about 20-22 years of age, coming mostly from small cities, towns and rural districts in Illinois. They were housed in 5 different places—remodeled houses and apartment buildings. The number of occupants to a room varied somewhat, being usually about 4-8. Although sleeping in five separate buildings, they were all closely associated in their technical class work and at meals. The men for the most part came directly from their homes, arriving in Chicago October 15 and 16. Three of the men were ill on their arrival, in two cases with symptoms that as described seem influenza-like. On the evenings of October 16 and 17 all men in the group were brought into especially close contact in the locker room of the University gymnasium while waiting for their physical examination.

The date of onset was determined by individual questioning in each case and could usually be fixed by the patient within a few hours as is characteristic of influenza. The cases developed as follows:

Date of Onset	No. of Cases	Date of Onset	No. of Cases
Oct. 15 }	3 (Ill on arrival in Chicago)	Oct. 20	22
Oct. 16 }		Oct. 21	13
Oct. 17	10	Oct. 22	4
Oct. 18	14	Nov. 4.....	1
Oct. 19	29	No definite information.....	9

Received for publication Feb. 20, 1919.

* Influenza Investigations, U. S. Public Health Service.

The situation became known to the University authorities on October 20, and all the affected men were removed to an emergency hospital.

Daily temperatures were taken of the rest of the group for one week. Isolation followed any sign of fever. The number of men in each building at the beginning of the outbreak and the corresponding number of cases is as follows:

Building	No. of Men	No. of Cases
A	15	5
B { Upper	61	29
{ Lower	30	11
C	19	4
E	40	17
F	51	16

In each of three buildings (Lower B, E and F—121 men) one man was ill on arrival; in these houses 8 cases developed on October 17; in the remainder (A, Upper B and C—95 men) with no known cases of illness before October 17, two cases developed on the 17th. In the later cases the time and place distribution did not give any indication that infection occurred principally in sleeping quarters.

The chief symptoms accompanying onset were (100 cases):

Headache	66
Muscle Pains.....	56
Sore Throat.....	37
Cough	34
Nosebleed	8

Fever ranging from 100-104 F. was present in all these cases. The face was usually deeply flushed and the conjunctiva more or less injected.

Information was obtained about previous illness in 87 cases. In eight instances there had been definite illness within a year: malaria, 3; measles, 2; rubella, 1; mumps, 1; bronchitis, 1. Prior to January, 1918, there had been in addition to the usual diseases of childhood: typhoid, 5; scarlet fever, 4; diphtheria, 2; pneumonia, 6; "grippe," 3. In two cases tonsils had been removed. Two men gave a history of frequent colds in winter. In the group as a whole there was no evidence of respiratory tract ailments just prior to the outbreak.

Meals were served to these men in a separate building several blocks away from their dormitories. Mess-kits were not used. The food and general supervision were the same as for the rest of the

student community including Section A of the S. A. T. C. The men had nothing to do with the washing of dishes and tableware which are known to have been thoroughly cleansed in boiling water.

During the epidemic period another group (Section A) of the Student Army Training Corps were likewise under observation. The majority of this group (685) were housed in dormitories and fraternity buildings under conditions very similar to those obtaining in Section B. Their class rooms and eating places were entirely apart from those of Section B, and the men of the two groups came into no sort of formal contact with one another. The cases of influenza among 685 men in Section A occurred as follows:

Week Ending	Cases in Section A
Oct. 5.....	7
Oct. 12.....	10
Oct. 19*.....	7
Oct. 24.....	4
Nov. 2.....	2
Nov. 9.....	3

*Week of maximum prevalence in Chicago.

The number affected in the different dormitories used by Section A is as follows:

	Approximate Number of Men	Number of Cases Influenza
H	215	14*
S	120	6
M D.....	50	4
N D.....	100	4
S D.....	100	3
P	100	2
	<hr/> 685	<hr/> 33†

* These cases developed on well-scattered dates between October 6 and November 8, never more than two in one day.
† Two of these cases developed pneumonia; there were no deaths.

In addition to this number there were 271 men of Section A living in barracks — half of this number after October 20, the other half after October 29; only two cases of influenza developed in this group, both on the same day (November 8). At the time these men entered barracks influenza in Chicago had decreased considerably from the maximum. Beginning with the assembling of the students, October 1, and throughout the epidemic period, special care was taken to detect cases of incipient illness. Frequent talks were given to men and officers and all men of Section A with any sign of illness, objective or

subjective, were instructed to report to the medical officer, and whether "simple colds" or suspected influenza, were at once isolated in the hospitals or sent to their homes. During the whole period lectures and other classes were held as usual, one group of 350 men meeting three times a week.

The groups may be compared as follows:

	Section A	Section B
Number of men.....	685	234
Cases influenza developing October 17-22.	2	92
Total cases influenza developing October 17 to November 8.....	26	93*
Cases pneumonia	2	12
Deaths	0	2

*In nine others the exact date of onset could not be ascertained.

The mode of housing was similar in the two groups; the food supply was under central supervision and the men themselves had nothing to do with its preparation or serving; neither group received any specific or mixed influenza vaccines. The cases of illness that developed in Section A were quickly isolated, whereas in Section B isolation was less early and much less complete.

Cessation of influenza in Section B followed immediately after the isolation of all cases and the inauguration of daily inspection. The natural immunity of the men of Section B who had not become infected before October 21 was undoubtedly relatively high.

A third group of students, men and women, not living in barracks nor for the most part in dormitories, but at their own homes or in boarding houses gave the following record:

Number of students.....	82
Cases of influenza.....	7
Cases of pneumonia.....	1

The case incidence is here somewhat higher than in Section A where the greater restrictions placed on individual movement unquestionably decreased the amount of contact with the civilian community. The general degree of health supervision was also less than in the Student Army Training Corps unit.

Comparison of these two groups (Section A and civilian students) with the heavily affected Section B, in which the case incidence was about six times as great, indicates the importance of early detection and isolation of influenza cases as a preventive measure.

II. THE UNIVERSITY HIGH AND ELEMENTARY SCHOOLS

EDWIN O. JORDAN AND E. B. FINK

The University of Chicago, through its School of Education, maintains an elementary and a high school. In the office of the Director of Physical Education, careful records of all illnesses among students are kept. We are indebted to Dr. W. J. Monilaw, Physical Director, for opportunity to use his admirable records. Whenever a student is absent from class the teacher fills out a form slip and reports to the school physician. Each day the office secretary makes telephone inquiries as to the causes of absences. The information obtained from the family and the attending physician is recorded on the same form. Students returning after absences are required to report to the office of the school physician for examination. Cases of illness developing during school hours are always examined for the detection of contagious diseases, a woman physician being in attendance for girls. A permanent daily record of all illnesses by classes and cause of illness is kept on file.

The data contained in these records have furnished an opportunity for an epidemiologic study of influenza during the autumn quarter, 1918, as it affected a select group of individuals. The student body consists of boys and girls in the immediate neighborhood of the University, many of them from the families of members of the University faculties. The clientèle of the school is such that physicians are more likely to be consulted for minor illnesses than is the case with children in public schools.

Elementary School.—The autumn quarter began October 1 and ended Dec. 20, 1918, covering a period of approximately 12 weeks. At the beginning of the quarter there were registered 391 pupils, of whom 199 were boys and 192, girls, the youngest being 4 years and the oldest 13 years old. Ninety-seven (97) cases of influenza were reported, a morbidity rate of 24.8 per cent. There were 50 cases among boys and 47 among girls.

Table 1 shows the distribution of illness by months according to grades together with the number and ages of the pupils in each grade. Under the heading, colds, are included "pharyngitis" and "laryngitis" (9 of pharyngitis and 26 of laryngitis). Combined in age groups 4-9 (137 pupils) and 9-14 (229 pupils) the former had 42 and the latter 55 influenza cases, making the attack rate higher in the younger

TABLE 1
CASES OF ILLNESS DEVELOPING IN ELEMENTARY SCHOOL BY MONTHS AND GRADES FROM
SPECIFIED CAUSES DURING AUTUMN QUARTER, 1918

Class	Number of Pupils*	Ages	Influenza			Colds			Nonrespiratory		
			Oct.	Nov.	Dec.	Oct.	Nov.	Dec.	Oct.	Nov.	Dec.
Kindergarten.....	32	4-6	2	2	6	8	12	5	7	2	1
1.....	24	6-7	3	4	9	5	33	4	5	6	6
2.....	51	8	6	2	3	19	11	6	12	1	7
3.....	30	8-9	1	2	2	11	8	6	3	1	4
4.....	57	9-10	2	10	4	16	13	11	2	7	1
5.....	58	10-11	4	4	5	10	10	8	15	6	4
6.....	58	11-12	8	8	..	19	10	10	5	10	9
7.....	56	12-13	5	3	2	16	15	5	11	8	6
Totals.....	366	4-13	31	35	31	104	112	55	60	41	38

* Blank space indicates no cases. "Colds" includes respiratory infections other than influenza such as pharyngitis, laryngitis, and bronchitis. "Nonrespiratory" includes headaches, accidents, intestinal disturbances, etc. "Number of Pupils" are those on the rolls in the middle of the autumn quarter.

TABLE 2
DATE OF DEVELOPMENT OF INFLUENZA BY WEEKS, AUTUMN QUARTER, 1918, AS COMPARED WITH
COLDS, AUTUMN QUARTER, 1918 AND 1917
Elementary School

Class		Week Ending												Total	
		October				November					December				
		5	12	19	26	2	9	16	23	30	7	14	21		28
Kindergarten	Influenza.....	1	..	1	..	..	1	1	..	..	3	2	1	..	10
	Colds.....	1	2	2	2	1	2	5	3	1	3	2	..	..	24
1	Influenza.....	..	..	2	1	1	..	1	..	2	3	1	5	..	16
	Colds.....	..	1	2	2	..	4	6	1	2	1	2	1	..	22
2	Influenza.....	3	2	1	..	..	..	..	..	2	3	..	..	..	11
	Colds.....	4	6	4	4	2	1	1	3	..	3	3	..	..	30
3	Influenza.....	..	..	1	..	1	1	..	..	..	1	..	1	..	5
	Colds.....	2	5	3	..	..	1	3	2	2	4	1	1	..	24
4	Influenza.....	..	2	..	..	..	1	..	2	7	2	..	2	..	16
	Colds.....	3	7	3	1	..	..	3	6	3	5	4	2	..	37
5	Influenza.....	2	..	1	1	..	..	2	1	1	2	2	1	..	13
	Colds.....	3	3	2	2	1	..	5	2	4	2	4	2	..	30
6	Influenza.....	4	3	..	1	1	..	..	3	4	..	..	..	..	16
	Colds.....	5	6	3	3	..	..	2	4	3	5	5	..	..	36
7	Influenza.....	3	1	1	..	..	..	..	..	3	1	1	..	..	10
	Colds.....	2	4	0	1	3	..	2	2	..	4	..	1	..	19
Totals:	Influenza.....	13	8	7	3	3	3	4	6	19	15	6	10	..	97
	Colds.....	20	34	19	15	7	7	27	23	15	27	21	7	..	222
	Colds, 1917.....	15	23	17	12	12	15	21	10	6	15	19	5	1	171

Note: During the autumn quarter, 1917, there were 2 cases of "grip" reported in the elementary school—1 with an illness of 6 days, the other, 11 days.

children (307 against 240). Compared by months, November showed the largest number of cases, and of these there were more in the kindergarten and Grade 6 B than in the other classes. The month of highest incidence of colds corresponds with the month of greatest prevalence of influenza and the age and class distribution is about the same; the 7th grade pupils varying in age from 12-13 had as many colds as the 4th grade, both being highest with 44 cases each.

A comparison of the number of days illness due to influenza and colds shows that in October, 31 cases of influenza caused 555 days illness, as against 78 cases of colds with an illness of 520 days; in November the ratio was 35 cases of influenza with 502 days illness and 78 colds with an illness of 499 days; in December, 31 cases of influenza resulted in 494 days illness compared with 60 cases of colds

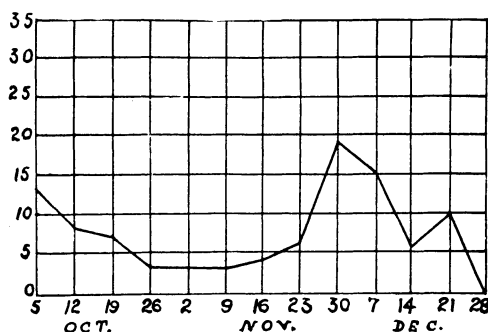


Chart 1.—Showing date of development of cases of influenza, elementary school, autumn quarter, 1918, by weeks.

and 360 days illness. The average period of illness was more than twice as long in influenza as in colds. The number of days of illness caused by influenza is 555 as compared with 825 days from all other causes during October, 502 to 816 in November and 494 to 502 in December. There were 12 instances in which 2 children, and 1 in which 3 children in the same family were reported ill with influenza. One girl, 7 years old, had 3 attacks of so-called influenza, and 1 boy, 5 years old, had 2.

Table 2 and Charts 1-3 show the development of cases of influenza by weeks during the autumn quarter, 1918, and of colds for the same period and for the corresponding quarter, 1917. During the first week of school in 1918, 13 cases of influenza were reported. Following this there was a gradual decline extending over two weeks, to the level

of 3 cases where it remained for 3 weeks, then in the 2 weeks following went up to 4 and 6, respectively, and suddenly during the week ending November 30 jumped to 19 cases, followed by a decline extending over 3 weeks to 10 cases during the last week of the quarter. The epidemic was characterized by a moderate outbreak during the first week of school, followed by a decline extending over 2 weeks to a low level, which was maintained for 5 weeks and then a sudden peak reaching the highest point in the epidemic during the week ending November 30, followed by a decline extending over 3 weeks. While the height of the epidemic of influenza in the city at large was reached during the week ending October 26, as shown by the mortality from influenza and pneumonia, the epidemic among this particular school population did not reach its highest level until the week ending

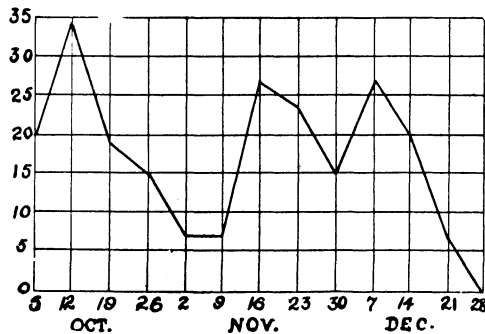


Chart 2.—Showing date of development of colds (other respiratory infections), elementary school, autumn quarter, 1918, by weeks.

November 30. During the week of maximum mortality in Chicago, the number of cases developing among these school children was low, the maximum being reached 5 weeks later. Whether, as is probable, this has any relation to the prevalence of influenza in the portion of the city where the school is located is not certainly known; it was noted in general that the epidemic did not develop in certain districts of the city until after it had subsided in others.

Chart 2 shows that colds in 1918 rose to a high point during the first week, reaching their highest level during the second week, followed by a sharp decline to the lowest level at the fifth week, where they remained 1 week, to rise sharply to a second peak at a lower level than the first one, followed by another sharp decline over 2 weeks to about one-half the lowest level, and in the next week a third peak to

about the level of the second followed by a rapid decline in the last two weeks of school.

A comparison of the curves for influenza and colds shows that the period of highest incidence of colds was in the second week of school and preceded the corresponding period for influenza by 7 weeks. There are 3 peaks in the curve for colds, and only 2 in that for influenza. The period of highest incidence of colds follows the first peak in the influenza curve by 1 week, while during the week of greatest prevalence of influenza there is a sharp fall in the number of cases of colds. The third peak in the curve for colds occurs just 1 week after the height of the influenza curve. The curve for colds as a whole runs at a higher level than that for influenza. A striking thing is that the portion of the curve for influenza contained within

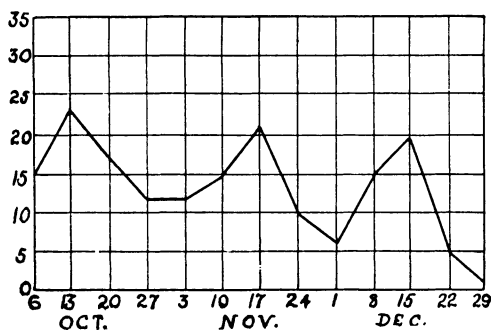


Chart 3.—Showing date of development of colds (other respiratory infections), elementary school, autumn quarter, 1917, by weeks.

the period November 23 to December 7 is almost the exact opposite of the corresponding portion in the curve for colds. How much of this is due to the factor of diagnosis is difficult to say.

The curve for colds in the autumn quarter, 1917, has in general the same outline as the one for 1918. (Chart 3.) It, too, contains three peaks, the first two occurring at exactly the same time, the last a week later. Colds in 1918 were at a higher level than in 1917. The figures for 1917 and 1918 are closely comparable, since they deal largely with the same individuals. About 100 pupils leave school annually, about 50 graduating. The majority of new pupils enter the kindergarten, the rest replace children who have moved or leave for various reasons. The exact number of pupils in 1917 is 380 compared with 391 in 1918, about 300 being the same in both groups.

There are 21 teachers in the elementary school, and among these 5 cases of influenza were reported. Two occurred in the second week of October, 2 in the second week of December and 1 in the fourth week of December, with a total illness of 61 days. Two were second grade teachers, one a substitute, one special and one a teacher of physical culture. There were no complications and no deaths. As far as could be determined there seemed to be no evidence that any of the teachers acted as a focus of infection.

Of the 97 cases of influenza reported among the grade school pupils, none developed pneumonia, and there was no death.

TABLE 3
COMPARATIVE NUMBER OF CASES OF INFLUENZA AND COLDS, AUTUMN QUARTER, 1918 AND 1917,
BY WEEKS AND SEX. HIGH SCHOOL

	Week Ending														Totals
	October				November					December					
	5	12	19	26	2	9	16	23	30	7	14	21	28		
Influenza, 1918:															
Boys.....	6	5	..	1	..	1	2	1	8	4	6	5	2	41	
Girls.....	17	3	4	4	1	1	2	..	8	1	5	3	1	50	
Totals.....	23	8	4	5	1	2	4	1	16	5	11	8	3	91	
Colds, 1918:															
Boys.....	8	6	10	7	3	1	1	1	2	13	11	7	6	76	
Girls.....	7	7	10	6	4	3	4	6	13	21	17	10	3	111	
Totals.....	15	13	20	13	7	4	5	7	15	34	28	17	9	187	
Colds, 1917:															
Boys.....	..	..	2	4	13	5	..	9	5	8	3	10	3	62
Girls.....	1	5	1	5	4	4	6	5	6	8	6	5	..	56	
Totals.....	1	5	3	9	17	9	6	14	11	16	9	15	3	118	

Note: In 1917, 2 cases of "grip" were reported, 1 with an absence of 4 days, the other 1 day.

High School.—At the beginning of the autumn quarter, 1918, there were 427 students registered in the high school, of whom 199 were boys and 228 girls. In age, they varied from 14-18 years. Many of the children graduating from the elementary school continue in the high school. Ninety-one cases of influenza were reported, a case incidence of 21.3%. A slightly larger number occurred among girls, the exact ratio being 41 for boys and 50 for girls, making the attack rate approximately the same for the two sexes.

During the same period there were 189 cases of colds as against 118 for the corresponding period in 1917.

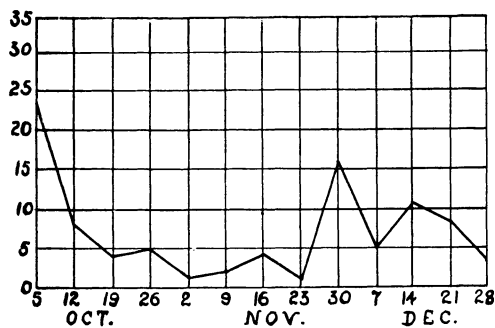


Chart 4.—Showing date of development of cases of influenza, high school, autumn quarter, 1918, by weeks.

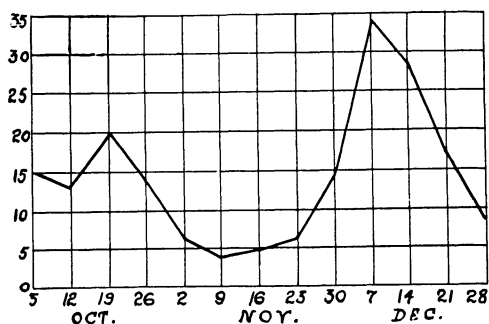


Chart 5.—Showing date of development of colds (other respiratory infections), high school, autumn quarter, 1918, by weeks.

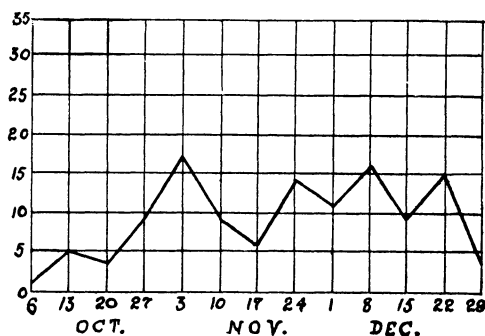


Chart 6.—Showing date of development of colds (other respiratory infections), high school, autumn quarter, 1917, by weeks.

Chart 4 illustrates graphically the curve of influenza by weeks. The week of highest incidence was the first week of school with 23 cases. This was followed by a sharp drop over a period of 2 weeks to a low level. A second peak occurred during the week ending November 30 with 16 cases, after which the epidemic rapidly subsided. A comparison with the course of influenza in the elementary school shows that in the high school the epidemic was most marked in the beginning, the secondary outbreak being less severe. The reverse was true of the elementary school. Both peaks occurred at the same time. The curve for influenza in the high school is at a slightly higher level than in the elementary school. The curve for colds is irregular. (Chart 5.) There are two peaks, the first occurring during the week when influenza had subsided after the first outbreak, the second a week following the second outbreak. Both correspond with sharp falls in the influenza curve. Colds in 1917 (Chart 6) followed a much more irregular course, never reaching the maximum height during 1918.

In October, 40 cases of influenza resulted in a loss of 331 school days as compared with 76 cases of other respiratory infections, including colds, which caused a loss of 236 school days and 72 cases including all nonrespiratory illnesses with an absence of 118 days. In November, 24 cases of influenza resulted in a loss of 118 school days, 46 cases of other respiratory diseases, 163 days, and all others combined totaled 59 cases and 112 days absence. In December, 27 cases of influenza resulted in an absence of 188 school days, other respiratory diseases 94 cases with a loss of 187 school days, while all other illnesses were 66 cases and 90 days lost. Almost as many school days were lost in October through influenza as from all other causes combined; during November the ratio was less than one-half and during December about two-thirds.

All cases of influenza recovered. Two cases of pneumonia were reported, both in girls. These were carefully investigated. One apparently started as a bronchitis while the other undoubtedly began as a severe influenza with chills, high temperature, prostration and general muscle pains. On account of its severity this case was diagnosed as pneumonia from the beginning.

Out of a total of 42 teachers in the high school, 6 developed influenza and all recovered.

An interesting feature of the figures given above is the rise in influenza cases in both the high and elementary schools about Novem-

ber 30, following the Thanksgiving recess from Wednesday to Monday. The parties and family gatherings at that time apparently afforded a better opportunity for influenza infection than the routine school life before and after the holiday period.

All the facts gathered afford no evidence that the schools served as distributing points for influenza infection.

III. THE CHICAGO TELEPHONE COMPANY

EDWIN O. JORDAN AND E. B. FINK

The Chicago Telephone Company maintains a sickness benefit system to which all employees who have been with the Company for a period of two years or more are eligible. For administrative purposes complete records of all cases of illness developing among employees entitled to benefits are kept in the Company's health department. Examination of these records has enabled us to determine the course of the influenza epidemic in Chicago in an occupational group of the adult population. We are greatly indebted to Mr. S. J. Larned for opportunity to examine these records and to Mr. H. W. Bang, Miss K. O'Rourke and Miss K. Ryan for valuable aid in assembling the data.

The figures cover the period from Sept. 1, 1918, to the middle of March, 1919, or 26 weeks. In January, 1919, which represents about the middle of the period covered, the Chicago Telephone Company had in its employ 14,208 individuals, 3,927 males and 10,281 females. Of the total number of employees, 53%, or 7,530, were eligible to sickness benefits. Approximately, 80% of the men, or 3,141, are entitled to disability benefits; and 40%, or 4,112 of the women. This difference is the natural result of the type of work in which the two sexes are engaged. The work done by the men is a specialized type of skilled labor, and the turnover is small. Shifting of the women workers is much more frequent.

The data include approximately 7,500 individuals of working age. Among these there developed a total of 1,448 cases of influenza (including "la grippe") during the period under consideration, an attack rate of 19.2%. There were 22 deaths attributed to influenza and influenza-pneumonia, a mortality of 1.5%.

Table 4 and Chart 7 illustrate the development of influenza cases by weeks. The epidemic was characterized by two distinct peaks. The first and higher began the third week in September, and shot up to a maximum of 180 cases for the week ending October 12, approximately four weeks after the beginning of the epidemic. The decline of the first wave was almost as sharp as its beginning and extended over a period of five weeks, reaching its lowest level during the week ending November 16. The rise of the second wave also covered a period of four weeks, reaching its maximum in the week ending December 14. The maximum number of cases developed during this week was 78, or less than one-half the height of the first peak. Following the second peak there was an irregular, but gradual decline extending over a period of 12 weeks.

TABLE 4

DATE OF DEVELOPMENT OF CASES OF INFLUENZA AND COLDS (ALL OTHER RESPIRATORY INFECTIONS) DURING THE PERIOD SEPT. 1, 1918, TO MARCH 15, 1919, BY WEEKS
CHICAGO TELEPHONE CO.

Week Ending	Influenza	Colds	Week Ending	Influenza	Colds
Sept. 7.....	2	2	Dec. 14.....	78	19
14.....	3	3	21.....	49	13
21.....	26	5	28.....	41	18
28.....	58	13	Jan. 4.....	54	28
Oct. 5.....	134	11	11.....	49	18
12.....	180	14	18.....	40	18
19.....	176	25	25.....	39	20
26.....	105	22	Feb. 2.....	26	15
Nov. 2.....	71	7	9.....	29	19
9.....	38	9	16.....	30	12
16.....	20	10	23.....	23	22
23.....	25	4	Mar. 1.....	25	25
30.....	38	6	8.....	19	24
Dec. 7.....	66	17	15.....	4	3
Total.....				1,448	402
Minimum.....				2	2
Maximum.....				180	28

During the same period there was a total of 402 colds (including all other acute respiratory infections except influenza). Chart 8 shows the development of these cases by weeks. The curve follows an irregular course at a low level with only two distinct peaks—the first, one week after the maximum week of influenza and the second, three weeks after a similar peak in the curve for influenza. During the corresponding period in the preceding year, 1917-18, a nonepidemic year, there was a total reported of 300 cases of “influenza” and “la grippe,” and 219 colds.

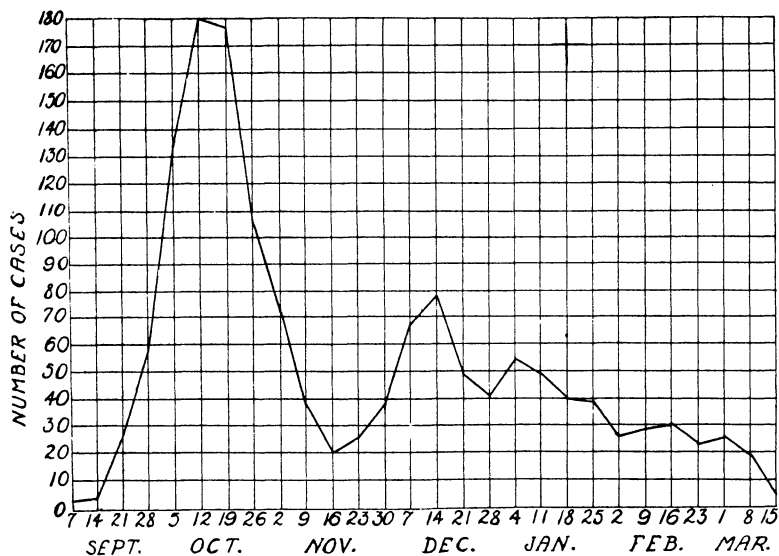


Chart 7.—Showing date of development of influenza cases, Chicago Telephone Co., Sept. 1, 1918, to March 15, 1919, by weeks.

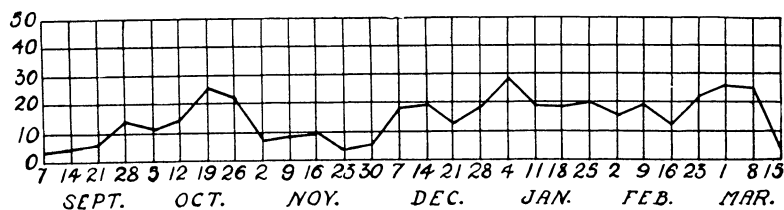


Chart 8.—Showing date of development of colds (other respiratory infections), Chicago Telephone Co., Sept. 1, 1918, to March 15, 1919, by weeks.

A comparison of the number of days lost on account of influenza and colds indicates that in 1,177 cases of influenza about which we were able to obtain a record of the period of disability, a total of 27,154 working days was lost, while 346 colds resulted in a loss of 7,374 days. The average number of days lost per case of influenza was 23, and of colds, 21. During six month, September, 1918, to February, 1919, inclusive, there was a total loss of 79,253 working days from illness of all kinds; influenza was responsible for 34% of the total loss. A comparison of the total number of days disability in 1917 and 1918 by months shows that during October, 1918, the month during which the influenza epidemic was at its maximum, there were more than twice as many days lost as in October, 1917. The effect of the entire epidemic is reflected in the sudden rise in disability for the corresponding months. During March and April, 1918, there was an epidemic of "la grippe" (a total of 409 cases), and during these months the total sickness disability reached nearly the high level of the recent influenza epidemic.

Table 5 presents the result of an analysis of 1,432 cases of influenza as to age and sex distribution. About 80% of the male employees of the Company are between the ages 20 and 35. Eighty per cent. of the women are between the ages 17 and 25, both inclusive. The majority of cases among women occurred within the age groups 16 to 30; among men, 26 to 40. Considering the age distribution of all the employees of the Company, the figures indicate that the cases of influenza were fairly evenly distributed in proportion to the number of people exposed at the different age groups. A total of 957 cases occurred among females; 475 among males, making the attack rate among the women 23%; among the men 15%.

TABLE 5
AGE AND SEX DISTRIBUTION OF INFLUENZA CASES, CHICAGO TELEPHONE CO.

Age Group	Males	Females	Age Group	Males	Females
16-20	8	200	41-45	41	8
21-25	37	447	46-50	11	5
26-30	128	220	51-55	3	1
31-35	150	56	56-60 and over	8	2
36-40	89	18			

The histories of 218 cases of influenza were examined to determine the most common symptoms and complications. Each record contained the certificate of a physician as to the diagnosis, complications and prognosis, the report of the visiting nurse, including pulse, temperature, respiration and general symptoms at the time visits were made, usually at 3-day intervals, and a report of the findings of the Company physician when the patient was ready to return to work.

The most frequent symptoms were high temperature, 101-103 F., weakness and prostration, pain in the back, headache, aches "all over." Occasionally epistaxis and profuse bleeding from the mouth were mentioned. Neuralgia of the face was complained of in one or two cases. The onset in some cases was characterized by chills, fever and cough; others began as a cold, sore throat and watering of the eyes and nose. In some cases the patients fainted while at work. On examination by the Company physician after recovery, inflamed tonsils were frequently found.

Table 6 shows the complications developing in the course of 218 cases of influenza. One hundred and fifty-seven, or 72%, were uncomplicated. The most frequent complication was bronchitis. A distressing complication occurring in 5 cases was a prolonged convalescence or postinfluenzal neurasthenia. Sinus infections occurred in about 2% of cases and otitis media in 1%. Pneumonia was diagnosed in 17 cases, or 7.8%. There were 2 deaths, a mortality of less than 1%.

TABLE 6
COMPLICATIONS IN 218 CASES OF INFLUENZA, CHICAGO TELEPHONE CO.

No recorded complications.....	157	Tonsillitis.....	4
Bronchitis.....	45	Gastritis.....	4
Pneumonia.....	17	Pleurisy.....	3
Relapses.....	9	Otitis media.....	3
Neurasthenia.....	5	Miscellaneous.....	12
Sinus infection.....	5		

An analysis of the records of the social service department has enabled us to determine the proportion of girls at the different telephone exchanges who were attacked with influenza. The data include all the employees at the same exchange — those entitled to disability benefits as well as those not entitled. In the case of those entitled to benefits the diagnoses and complications were based on physicians'

certificates as well as visiting nurses' records; the remainder were based on nurses' records alone where no physician was in attendance. The nurses' records included general symptoms as well as observations on temperature, pulse and respiration.

Table 7 shows the number of employees at each exchange, the number who had influenza during the period, September, 1918, to February, 1919, inclusive, and the attack rate. (Chart 9.) The total number of cases at all exchanges was 1,072, the total number of employees concerned was 7,804 (as of January, 1919), giving an attack rate of 13.6%. The highest percentage attacked by influenza at any exchange was 27, the lowest 3. It was noted by the administrators of the social

TABLE 7
PROPORTION OF TELEPHONE OPERATORS AT THE DIFFERENT EXCHANGES—CHICAGO TELEPHONE COMPANY—COMING DOWN WITH INFLUENZA DURING THE PERIOD, SEPTEMBER, 1918, TO FEBRUARY, 1919, INCLUSIVE

Exchange	Number of Girls at Each (Jan. 1919)	Rate of Attack	
		Number	Per Cent.
Austin.....	170	46	27
Belmont.....	178	28	16
Beverly.....	111	21	19
Burnside.....	11	1	9
Calumet.....	206	26	12
Canal.....	126	7	5
Central.....	549	52	9
Douglas.....	153	22	14
Edgewater.....	312	59	19
Humboldt.....	248	49	20
Hyde Park.....	348	46	13
Irving.....	177	36	21
Kedzie.....	265	31	11
Kildare.....	67	10	15
Lake View.....	352	52	14
Lawndale.....	221	35	16
Lincoln.....	180	32	18
Main.....	586	80	13
McKinley.....	86	15	17
Monroe.....	276	13	5
Oakland.....	487	66	13
Pullman.....	91	13	14
Rogers Park.....	108	18	17
South Chicago.....	126	4	3
Stewart.....	140	14	10
Superior.....	186	31	17
Wabash.....	508	72	12
Wentworth.....	335	63	19
West.....	171	14	8
Yards.....	274	31	11
Toll.....	416	61	14
Operators training.....	40	5	12
Pay station.....	110	10	9
Traffic department.....	100	9	9
Totals.....	7,804	1,072	13.7
Total pneumonia cases.....		71	6.6%
Total deaths.....		10	1.0%

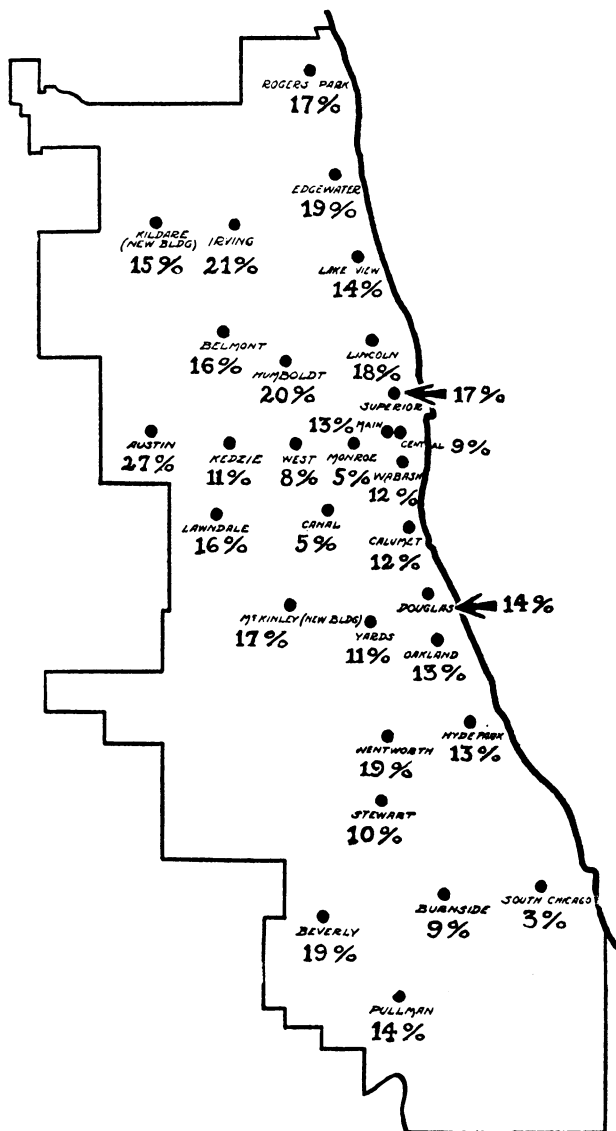


Chart 9.—Map showing location of telephone exchanges and proportion of girls at each exchange attacked by influenza. Chicago Telephone Co.

service department that the largest number of cases developed first on the northwest side, and it was not until about one month later that the epidemic reached the south side of the city. There were 71 cases of pneumonia recorded among the 1,072 cases of influenza, or a rate for this complication of 6.6%. Only 10 deaths were reported, a mortality rate of less than 1%. An interesting fact bearing on the source of infection noted in this series of cases as well as among those entitled to disability benefits, was that in a great many cases the record was made by the nurse that several or all other members of the family were ill with influenza. Frequently one or more deaths were reported among other members of the family. It is not considered worth while to record the exact number of times such an observation was made because the record of such family infection is manifestly incomplete.

SUMMARY

The data for the several groups may be brought together as follows:

TABLE 8
GENERAL SUMMARY OF OBSERVATIONS

Group	Number of Individuals	Influenza Attack Rate per 1,000	Case Fatality Rate	Proportion of Clinically Diagnosed Pneumonia to 100 Influenza Cases
1. Student Army Training Corps, Section A	685	39	0	7.7
2. Student Army Training Corps, Section B	234	398	2	13.0
3. Pupils, Elementary School, University of Chicago.....	291	248	0	0.0
4. Pupils, High School, University of Chicago	427	213	0	2.2
5. Teachers, Elementary and High Schools	63	175	0	0.0
6. Chicago Telephone Co. Employees Eligible to Disability Benefits...	7,530*	192	1.5	7.8†
7. Chicago Telephone Co. Women Employees at Exchanges.....	7,804	137	1	6.6

* Includes about 40% of Group 7.

† Based on 218 cases.

With respect to age, the figures show a higher attack rate among the pupils of the university elementary school (ages 4-13) than among those of the high school (ages 14-18); the teachers in these schools had a lower attack rate than the pupils. Apparently a definite age incidence is manifested since the pupils in these schools are from the

same section of the city and to a large extent from the same families, and were presumably exposed in similar degree.

With respect to sex, there was no noteworthy difference among the pupils in the high and elementary schools (attack rate—230 for boys, 231 for girls). It is fair to assume that the chances for acquiring infection were substantially the same for these children, and that one sex was as much exposed to infection as the other. Among the employees of the Chicago Telephone Company, on the other hand, the men were affected in considerably lower proportion than the women (151 per 1,000 for men, 233 for women). Probably the age factor was largely responsible for this difference, since the women employees are of a much lower average age than the men.

Illness reported under the heading of "colds," etc., seems to have been at a considerably higher level during the autumn of 1918 than during the corresponding period of 1917. This was particularly the case among the pupils of the university schools and to a somewhat lesser degree among the employees of the Chicago Telephone Company. Comparison of the reported cases of influenza and colds in the latter group for the months September-November suggests that some cases of influenza were reported under the former heading.

The differing degrees of incidence in the various groups here considered are especially striking. The attack rate among the employees at the various Chicago telephone exchanges ranged from 30-270 per 1,000, altho the working conditions in the several exchanges were not materially different. The highest attack rate recorded for any group occurred among members of one section of the S. A. T. C. at the University of Chicago (398), while the lowest (39) was among the members of the other section of the same corps. The former group was particularly exposed to infection, while the latter, altho composed of men of similar ages living under substantially similar conditions with those of the first group, were guarded to a considerable extent against contact with beginning cases.

The data obtained in regard to the schools apparently indicate that the schools were not important distributing centers for the infection. No explosive outbreak occurred in any one grade, and the four days

of the Thanksgiving holiday evidently afforded more favorable opportunities for infection than did the days of regular school attendance. The low pneumonia incidence and the absence of deaths among the pupils of these schools (188 cases) is noteworthy.

The influence of careful supervision of a somewhat segregated group of individuals is shown by the low attack rate in Section A of the S. A. T. C.